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5.20. Corollas now about five-sixteenths of an inch above the others in disk. Pistils and stamens about two lines above the corollas. Long yellow ray petals half open, with no appearance of pollen on their pistils.

From this time forward there was no further growth of the corolla, so that this portion of the daily labor was accomplished in about three quarters of an hour.

5.25. Pistils and stamens beyond the corolla . . . 1-32d inch.

5.30. " " " . . . 1-16th "

5.35. " " " . . . $\frac{1}{8}$ th "

5.40. " " " . . . $\frac{1}{8}$ th "

5.45, 5.50. No change.

5.55. Pistils begin to project beyond the stamens. The first insect, a sand wasp appears. He inserts his proboscis down between the clavate pistil and the stamens, carrying away the pollen, which is all over his head.

6. 6.5. Pistils one line; stamens no longer lengthen.

6.10. Anthers are falling away from the pistils, which are two lines beyond.

6.15. No change.

6.20. The ray petals now fully open, that is horizontal.

No change was noticed after this, except the free visits of sand wasps; none of these, however, carried any pollen to the pistils in the ray florets.

About 9 o'clock (there had not been the slightest indications of any growth since 6.20) heavier insects began to arrive, and then the slightest touch broke off the florets, which fell on the ray pistils which happened to be below them, and in this way they were fertilized. These pistils died very soon afterwards. Those pistils on the upper side (the flower leaning a little) were quite fresh the next morning, awaiting some chance to be fertilized, insects, evidently, not performing that office.

We here see that there were three phases of growth, with a slight rest between each, the pistil taking the most time, then the stamens, and the corolla the least; but the whole growth of the day included within two hours.

I have used the term pistil for the clavate process which occupies the place of the true organ in the ray florets. Of course only the ray floret of *Silphium* have perfect pistils. This clavate false pistil, or ovary, has hitherto been supposed to be a necessary production for the fertilization of the plant. It was supposed to push out the pollen, which was thereby scattered to the ray florets about it. But these observations show that this is probably an error, and that fertilization is chiefly carried on by the easy falling away of the mass of stamens, as I have shown in a paper on *Euphorbia Jacquinæflora*, in last years *Proceedings*, is the case with that species.

I am anxious to call particular attention to the different ratios of growth in connection with the appearance of different floral organs in this plant, because I think I see traces of a general law in plants that there are vibrations or varying intensities during each season's growth, and that the production of various organs depends on degrees of these vibrations.

Observations on some Fishes new to the American Fauna, found at Newport, R. I. By Samuel Powell.

BY E. D. COPE.

A number of interesting additions to the ichthyological fauna of the United States having been sent to the Museum of the Academy of Natural Sciences by our fellow-member Samuel Powell, I place them on record for the convenience of ichthyologists. Several of the species, it will be observed, were new to science at the time they were received; some of these have been described by Prof. Gill. Most of these are of West Indian affinity, some being simply well known species of that region, which have wandered, as has been suggested by Gill, along the Gulf Stream, and turned aside on the southern coast of the New England States.

[Oct.

ACANTHOPTERYGII.

APOGON AMERICANUS *Apogonichthys* Castelnau, Voyage Amer. Merid. Tab. I. Cope, Trans. Amer. Philos. Soc. 1866, 400.

PRICANTHUS ALTUS Gill, Proc. Acad. Nat. Sci., Phila., 1862, 132.

HYPORTHODUS FLAVICAUDA Gill, l. c. 1861, 98; 1862, 133.

PROMICROPTERUS DECORATUS Gill, Proc. A. N. Sci., 1863, 164.

D. II. 26. A. 16 scales 11—98—46, counted from base of second dorsal spine. Dorsal fins connected by membrane as elevated as that of the first dorsal. Head (from premaxilla to end of spine) more than four times in length including caudal fin. Pectorals not narrowed. Eye 5.33 times in length of head. Otherwise as in *P. maculatus* Hol.

Color dark brown, covered with large round pale spots as large as the orbit, each with a brown central spot. They extend on the dorsal and proximal caudal fins. Second dorsal, anal, and caudal fin broadly blackish edged.

Another character in which this species differs from *P. maculatus* is the gentle and gradual rise of the lateral line from the suprascapula. In the latter, it forms a weak sigmoid with abrupt upward curvature. From Newport, Rhode Island; discovered by my friend Samuel Powell of that place, among many other highly interesting fishes. As no one else has detected the *Promicropterus decoratus* on any other part of the coast of the United States, it must be a rare species. Prof. Gill originally described it as coming from Panama.

VOMER CURTUS Cope, sp. nov.

This species is intermediate in form between *Vomer setipinnis* Mitch., and *Selene argentea* Lac. It is, therefore, shorter and deeper than the former, and with dorsal and ventral outline more convex. The pectoral fin is also longer, and the eye larger. The prominence of the front is anterior in position to that which it occupies in the latter, hence the fish has a less rhomboid, and more regular form. The first anal ray is further in advance of the first of the second dorsal than in *V. brownii*, and not so far as in *S. argentea*.

Radii D. III with membrane, III without,—22. A 19. The pectoral reaches the ventral outline at the tenth soft anal ray. The greatest depth of the head measured along the anterior limb of the orbit enters the total to the caudal emargination 1.8 times—in *V. setipinnis* 2.5 times; depth at first anal ray, in the same, 1.66 times; in *V. setipinnis* nearly twice. Eye into length of head, horizontally through orbit, 2.75 times; into length along front, 4.6 times. Muzzle projecting enclosing a strong concavity with front line much stronger than in *V. brownii* or *S. argentea*. Total length 0m. 165. Length of head from muzzle along lower margin of orbit 0m. 046. Color silvery, without spots.

A second specimen from the North American Atlantic coast, the precise locality not recorded. Bonaparte collection in Mus. Academy Natural Sciences.

The structure of the fins in this species is precisely similar to that seen in *V. setipinnis*, and in general it resembles that species very closely. The differences are readily observed on comparison with specimens of the latter of the same size.

SAROTHRODUS MACULOCINCTUS Gill, Pr. A. N. Sci., 1861, 99. Only found at Newport.

GLYPHIDODON SAXATILIS Linn.

An abundant West Indian species.

MALACOPTERYGII.

HEMIRHAMPHUS UNIFASCIATUS Ranzani.

A West Indian fish.

1870.]

PLECTOGNATHI.

BALISTES POWELLII Cope, sp. nov.

This is a species allied in form and color to the *B. moribundus*, but apparently nearer to the species of Hollard's group II. A.*

Radii 2 D. 26, A. 22, preanals 9 or 10 on each side; P. 13—4, C. 12, rounded. Form elevated, pelvic depth 1.75 times in total length. Front convex from basis of dorsal fin to spines of premaxillaries. Orbit 3.65 times in muzzle; jaws equal. Scales without prominent spines, those of the cheek in oblique series. Two or three scapular plates. First dorsal spine 1.25 times in length of muzzle, rugose. Third dorsal spine well developed. Anterior rays of second dorsal and anal not much longer than the median rays. Length of head (to opercular slit) 3.5 times in total; anal depth 2.25 in the same.

Color above, ashy, below white. Numerous longitudinally oval azure spots extend in series on the sides everywhere except between the chin, pectoral fin and pelvic bone. The dorsal and anal fins are marked with smaller spots of the same.

This species was discovered by my friend Samuel Powell, at Newport, Rhode Island, Sept., 1867. It must be a very rare species, as it has not been met with elsewhere, so far as I am aware. I have pleasure in dedicating it to the discoverer, whose attention to ichthyology has been so often attended with interesting results.

TETRAODON TRICHOCEPHALUS Cope, sp. nov.

Belly spinous to near vent; dorsal region from a little behind the nares to above the ends of the pectoral fins spinous, those on the head long, close set, like seal bristles. Profile suddenly descending from the prefrontal region to the premaxillary region, arched from the former point backwards. Eye 3.5 times in head, 2.66 times in muzzle; length of head 3.5 times in total including caudal fin. Radii, D. 8, A. 7. Caudal fin even with prominent points, concave when closed. Anal fin behind opposite the dorsal. Frontal width 1.25 times in orbit. Length four inches.

Color, below to a line from the chin to the inferior third of the caudal fin, white; above yellowish passing into brown on the dorsal region. The latter color is faintly verniculated with the paler color, as it descends on the sides. Fins uniform straw colored; a brown spot at the base of the pectoral fin.

This species differs in color from *T. turgidus* Mitch., and in the less extent and longer form of the spines, as well as in the declive front. The young of *T. turgidus* of one-fifth the length have a more slender muzzle and other characters of the adult. The numerous dorsal bristles and form of the cranium distinguish it from *T. lævigatus*. It was found by Samuel Powell at Newport, R. I., with the following species:

TETRAODON GEOMETRICUS *L. Anechisoma* Kaup, Voy. Sulphur, plate.

A West Indian species not before detected on the coasts of the United States. We have it from the Mexican coasts and from Panama.

Supplementary note on two new fishes from the Southern Coast.

CENTROPRISTIS SUBLIGARIUS Cope.

Radii, D. X. 14; A. III. 8. Scales, counted transversely to vent, $5\frac{1}{2}$ —48—18. Median dorsal spines subequal, median anal appressed extending beyond basis of anal fin. Caudal fin truncate behind. Form elongate oval, the head narrow conical, its profile continuous with that of the anterior back, together descending regularly from D. I to the end of the acute muzzle. Mandible projecting a little beyond upper lip. Maxillary bone extending to opposite posterior margin of pupil. Operculum with three points, the superior very

* (*B. capricus* type); the description is taken from a specimen only 3.5 inches in length.

short. Maxillary smooth; cheeks and operculum scaly, the cheek minutely. Scales ceasing on vertex at a point behind a vertical drawn from the posterior margin of the pupil. Interorbital width .70 of the diameter of the orbit. Latter a little less than length of muzzle, four times in length of head to base of longest spine. Depth at ventral fins 2.75 times in length without caudal fin. Length of head (without opercular flap) 2.66 times in same.

The coloration is handsome. Ground chocolate brown, the cheeks interoperculum, mandible and maxillary region with a coarse net-work of white lines. Pectoral region paler, and fading on the belly to a white and then metallic citron yellow, which is bounded abruptly by the ground color behind, at a point a little in advance of the anal fin. The posterior outline rises irregularly half way to the lateral line and then turns forward and descends a short distance behind the pectoral fin. From this patch backwards to the basis of the caudal fin there are five vertical cross-bands, two on the peduncle and two rising from the anal fin. The latter diverge above and another band rises, expanding to the point of junction of the dorsal fins, and spreads in a rounded black spot to their margin. The pectoral and caudal fins are white, with rows of small brown spots, the second dorsal and anal brown with rows of small white spots.

Length 0m 075; to basis DI. 026, to basis of anal .044; longest dorsal spine .010; depth caudal peduncle .0095; length do. above .0055.

The habitat of this sea perch is the southern coast near Pensacola. It was contained in a bottle with *Abaster erythrogrammus*, *Elaps fulvius*, etc. Its zoological affinities are to the *C. phoebe* of Poey, and other West Indian species; it is one of the most elegant of the genus.

GOBIESOX STRUMOSUS Cope, sp. nov.

Radii, D. XI; C. 16; A. 10; P. 21. Head exceedingly wide, width 2.5-6ths times in total including caudal fin. This width is partly produced by a large fleshy mass which extends from the end of the prominent extremity of the maxillary bone to the end of the interoperculum. Subopercular spine short, stout. Eyes small, diameter 2.5 times in interorbital width, over seven times in head, more than twice in muzzle. Superior dental series twelve on each side externally, but the three median conceal some series of which the second three external are a continuation. Inferior teeth eleven on each side; four median incisors, horizontal and subequal; no marked canine. Vertex flat, profile descending abruptly from posterior line of the orbits to labial margin. Anterior basis of dorsal in front of last fourth of length exclusive of caudal fin.

Length two and a half inches. Color in spirits bluish lead-color; fins blackish.

From Hilton Head, S. Carolina. Presented to the Academy of Natural Sciences by Thos. J. Craven.

Note on Fishes from Atlantic City, N. J.

A small and interesting collection of fishes, made at the above locality, was placed in my hands for determination by Edward S. Keed. He has added two species to the marine fauna of New Jersey, which I here note:

PRIACANTHUS ALTUS Gill, supra.

HEMIRHAMPHUS MACRORHYNCHUS C. V. Putnam, Proceed. Bost. Soc. N. H., 1870, p. 236.

This West Indian species was not known from the Eastern coast of the United States prior to the notice of Prof. Putnam, above cited, who procured it from the coast of Massachusetts.

1870.]